Permit Guidance 5 Final	Pollutant Minimization Programs	
	Rule reference: OAC 3745-33-07(C)(4) and OAC 3745-33-09	Revision 0 August 13, 1998

Background and Overview -

For the Lake Erie drainage basin, pollutant minimization programs (PMPs) are required for any pollutant that has a permit limit less than the analytical quantification level for that pollutant. Because of the uncertainty factors used in water quality criteria calculations, it's possible for a water-quality-based effluent limit to be less than the quantification level (e.g., toxicity test results are divided by uncertainty factors to arrive at the criteria, or bioaccumulation factors are used to convert dietary doses into water concentrations). In these cases, compliance with water-quality-based effluent limits (WQBELs) can not be accurately measured. The pollutant minimization program is required to increase the probability that the WQBEL will actually be achieved (e.g. thru pollution prevention or treatment).

For the Ohio River drainage basin, the discharger must submit a PMP plan-of study as part of the application for a mercury variance under OAC 3745-33-07(D)(9) and (10).

A PMP consists of three elements: 1) a control strategy / plan-of study for locating, identifying, and, where cost-effective, reducing the sources of the pollutant that contribute to discharge levels. A PMP is not necessarily related to pollution prevention, but examining pollution prevention alternatives is encouraged by the rule. PMP strategies may include any cost-effective process for reducing pollutant levels, including pollution prevention, treatment, best management practices or other control mechanisms; 2) monitoring to track the progress of the PMP; and 3) an annual report of the results of the PMP.

The PMP is meant to be a self-revising process - results from the annual report should be fed-back into the control strategy / plan-of-study to address problems discovered, and investigate new areas where the pollutant might be found. The goal of the PMP is to maintain the effluent at or below the WQBEL. When this goal is realized, that is, when the discharger can be reasonably expected to be in compliance with the WQBEL, then the PMP requirements can be removed from the permit.

Control Strategies / Plans-of Study -

A control strategy is a method for controlling and monitoring identified sources of pollutants. The plan-of-study is a way of investigating and locating sources of the pollutants subject to PMPs. Permittees need to examine all potential sources of the pollutant tributary to their outfall or treatment plant. The term "source" is intentionally not defined so that all potential inputs are considered, and to provide flexibility in monitoring requirements. Sources may include: individual plant processes, raw materials, treatment chemicals, significant and non-significant industrial, commercial and domestic users of the treatment plant, storm water inputs, groundwater (Inflow & Infiltration) inputs, atmospheric deposition, and wastestreams or sewers tributary to the treatment plant.

Ohio EPA does not usually approve control strategies or plans-of-study before they are implemented (but may comment). This is to encourage dischargers that choose to begin PMP efforts prior to permit

renewal, and to recognize the individuality of control strategies. The exception to this is a plan-of-study submitted with a mercury variance request (under OAC 3745-33-07(D)(9) and (10)), which is reviewed as part of the variance package.

A plan-of-study needs to be included with the control strategy. This is an investigation plan, and is similar to the study plans submitted for mercury variances and Toxicity Reduction Evaluations. A plan-of-study for the PMP might identify sources of data to be reviewed and points to be sampled in the initial stages of the PMP.

The object of the investigation is to search for sources and see if they account for the levels of pollutant found in the final wastestreams (effluent, sludge, air, etc.). There are at least two basic methods - 1) use existing information sources to locate potential sources for monitoring, or 2) sample inputs to the treatment plant in a hierarchical, or tree-branch way. These can be done separately or in parallel. Obvious information sources include: existing process or Industrial user info., Right-To-Know data, and USEPA Development Document. data on a particular industry. Evaluating existing process information would include evaluation of raw materials, unintended by- or reaction products, treatment additives. Right-To-Know or Material Safety Data Sheets (MSDS) for processes or chemicals may provide gross-level information, but are not required to be completed for trace materials. Federal development documents often contain chemical sampling data and other useful information on pollutants found in industry wastestreams. The permittee would follow up with sampling of these potential sources and see if they account for a significant portion of the plant influent load.

The second method would be to search hierarchically to make sure that potential sources aren't missed. In this procedure, a permittee would sample main sewers coming into the treatment plant. They may also need to sample sewer sludges or storm drainage ditch sediments tributary to the outfall to determine if in-place pollutants contribute to the loading. If these data show particular sources, the permittee can focus efforts on a smaller area, and repeat the sampling process. If no sources are indicated in the first round of sampling, the permittee could go to the next level of sewer size and do the process again.

It may also be possible to combine these approaches by concentrating hierarchical monitoring in areas where the pollutant might be expected (industrial parks or commercial areas), while maintaining some level of baseline sampling on residential areas. It may also be more efficient to go through the existing data sources first to see if this uncovers any potential sources, which may save on sampling expenses. Ohio EPA recognizes that raw domestic wastewater may contain significant concentrations of certain pollutants (e.g. mercury) that will be subject to PMP requirements. In these cases, "sources" may be defined geographically, as sampling points in sewers, if data show these locations to contain the pollutant.

Sources may be removed from the Plan-of-study/Control Strategy in two ways: Obviously, when a pollutant is eliminated from a facility or process through pollution prevention or recycling, that discharge is no longer a source, and the facility can report that as a success. A source can also be removed if there is an extended period of non-detects before considering source eliminated. We would probably want to see something like 10 ND values over at least a year before removing a source based on monitoring data.

If the data indicates only occasional detections of the pollutant, the permittee can drop some sampling locations and add others to try and close in on a particular source or geographic area.

Controls and Cost-effectiveness

Controls can be anything that reduces the amount of the pollutant contributed to the discharge. Ohio

EPA encourages permittees and industrial users to investigate pollution prevention techniques as controls. Ohio EPA's Office of Pollution Prevention has many industry- and pollutant-specific documents that can assist in pollution prevention efforts and provide case studies. Ohio EPA has also published a pollution prevention guidance document on mercury, in particular, because it is the pollutant most often associated with PMP programs. This mercury document is available on the Division of Surface Water web site (Go to http://www.epa.ohio.gov/ go the Division of Surface Water Page, then What's New and look for the Great Lakes Pollution Prevention Guidance), or can be obtained from the Division by calling (614) 644-2154.

Pollution prevention is not the only strategy possible for controls. If discrete sources of a pollutant can be identified, it may be possible to treat these sources to levels that will advance the control strategy. This is a common practice for industrial discharges which pretreat for certain pollutants prior to the main treatment (e.g. treating for cyanide at metal finishing facilities or metal-bearing wastestreams at organic chemical plants). These smaller-scale treatment systems can be used for other sources with treatable concentrations.

All controls, whether treatment or pollution prevention, must be cost-effective for the permittee or industrial user source. Cost-effectiveness is determined by the facility source. While Ohio EPA does not generally review these assessments, the permittee should keep the cost analysis on file. Ohio EPA does not intend to debate the details of cost-analysis, but may review the information to make sure that grossly inaccurate data about common pollutant controls are not used.

Special Considerations for Residential Sources

While individual residences can be potential sources of pollutants, traditional control strategies are not appropriate. An appropriate pollution prevention strategy for residences would be education campaigns about household chemicals and materials that contain the pollutant, particularly in neighborhoods where sewer data indicates that the pollutant is present. If the pollutant can be collected and recycled or disposed of in an approved hazardous waste facility, sponsoring waste collection days should also be considered as an appropriate control mechanism.

If residential sewers are potential sources of the pollutant subject to the PMP, some sampling of these areas will be needed. The rule does not exactly say that every individual source needs to be sampled; however, it also does not exempt any categories of potential source, either. Therefore at least some sampling of residential sewers would be needed semi-annually.

One suggestion for sampling residential sources would be to spot-test some of them semi-annually during the period of the PMP. A permittee could stick with a few and collect a significant amount of data, random sample several different areas, or some combination of the two. The exact sampling strategy would depend on the objective. This would establish the levels associated with "normal" domestic loadings, provide a baseline to measure the progress of educational programs against, and identify any odd "hot spots" that may unexpectedly show up. The level of sampling should factor in the significance of residential sources compared with other potential sources in the sewer system.

Monitoring -

At a minimum, Rule 3745-33-09 requires that the treatment plant influent be monitored once per quarter, and that potential sources be monitored twice per year. Sampling of known sources (e.g., where mercury is used or routinely detected) should be conducted more often (at least once per month). Where practical,

hierarchical sampling should be done for a given plant or sewer area at the same time (in the same sampling run), to provide more perspective as to the fate of the pollutant in the system. To be practical for larger sewer systems, this would mean sampling sections or geographic areas of the system at the same time. Sludge monitoring data may also be required to establish mass-balance information for the system.

Where there are large numbers of individual sources (like residential areas), one could do representative sampling to determine how much a given type of source adds to the system load. While the rule does not exactly say that every individual source needs to be sampled, it also does not exempt any categories of potential source, either.

For these kinds of sources one strategy would be to spot-test some of them semi-annually during the period of the PMP. A permittee could stick with a few and collect a significant amount of data, random hit several different areas, or some combination of the two. The exact sampling strategy would depend on the objective. This would establish the levels associated with "normal" domestic loadings, provide a baseline to measure the progress of educational programs against, and identify any odd "hot spots" that may unexpectedly show up.

Does "monitoring" mean sampling and chemical analysis only? What happens when pollutants are not routinely detected at a source or the plant influent? To start with, Ohio EPA will consider "monitoring" to mean sampling and chemical analysis to meet the requirements of this rule, simply because it is the best indicator of the presence and concentration of the pollutant. However, if a PMP starts to succeed in reducing pollutant loadings from a source or plant influent, there may be a point where chemical analysis will start to show mostly non-detections, even if there is still a source of pollutants. At this point other means of "monitoring", or tracking, such as mass- or materials-balance calculations, may be more useful in monitoring PMP progress than chemical analysis. If a discharger has substantially identified a source of the pollutant, and wants to use an alternative tracking mechanism, the discharger can request permit conditions that would establish mass-balance accounting as the means of monitoring. Ohio EPA anticipates that this will be most useful to industrial dischargers and smaller POTWs, which may have more easily identified sources than large public sewer systems.

Fish tissue monitoring (Bioaccumulative Chemicals of Concern)

When PMPs are required for Bioaccumulative Chemicals of Concern (BCCs), a permittee may track progress of the PMP using fish tissue data. Fish tissue studies work best for isolated dischargers. In a stream segment that contains a number of point sources in a short distance it may not be possible to distinguish one discharger's effect from another's. A permittee may also use fish tissue data to get out of PMP requirements (see "When a PMP is Not Required", below). These studies may be undertaken by permittees, or the Ohio EPA may require them, as a means of tracking PMP progress. For most PMPs, conducting fish tissue studies should be at the permittee's discretion. However, Ohio EPA does have the authority to require fish tissue and sediment sampling for instances where this is the most effective way to track the effluent's effect on the quality of the receiving water.

Fish tissue studies may be either caged fish or ambient fish studies, and would be conducted annually during the low-flow portion of the year. Permittees should note that fish collection requires a scientific collection permit from the Ohio Department of Natural Resources, Division of Wildlife. Ohio EPA will review and approve a discharger's fish tissue study plan. District staff should coordinate review of these studies with the Division Toxics Advisor and Ecological Assessment Unit staff.

The requirements of a permittee's fish tissue study will be somewhat site-specific. Fish would be

sampled or caged at an upstream site, and for at least two downstream sites. If the receiving stream flows into another waterbody within a short distance of the discharge (1-2 miles), Ohio EPA would likely require that the next stream be sampled upstream and downstream of the confluence.

The fish species used for the study will depend on the size of the stream and the endpoints (human health and/or wildlife effects) being evaluated. Human health effects are evaluated using analyses of sport fish fillets. Wildlife effects are evaluated using analyses of whole-body fish that form the food for the wildlife species being protected. Different species representing different trophic levels may be required; the ambient species evaluated will also be dependent on which species inhabit the receiving stream. Full species names are required for all fish tested.

Most BCCs also tend to accumulate in stream sediments. Ambient fish tissue studies will also need to measure sediment contaminant levels at the stream sites where fish are caught. This is important exposure information that can be used to interpret the effects of the discharge and ambient loadings of the pollutant on the stream biota.

Sample permit language:

"The permittee [MAY/SHALL] collect and analyze fish tissue samples for [POLLUTANT]. The permittee shall collect fish tissue samples at stations [801, 901, 902, etc.]. Fish species and sample types are given below. [IF THE PERMITTEE CONDUCTS FISH TISSUE MONITORING], the permittee shall collect and analyze receiving water sediment samples for [POLLUTANT] at stations [801, 901, 902, etc.]. Fish and sediment sampling shall be performed according to Ohio EPA protocols.

Location	Species	Sample Type
801 (upstream receiving water)	Wildlife Species 1,2 &3	Whole body
	Human Health Species 1,2 &3	Fillet
901(near downstream)	Wildlife Species 1,2 &3	Whole body
	Human Health Species 1,2 &3	Fillet
902(far downstream)	Wildlife Species 1,2 &3	Whole body
	Human Health Species 1,2 &3	Fillet
803 (upstream confluence)	Wildlife Species 1,2 &3	Whole Body
	Human Health Species 1,2 &3	Fillet
903 (downstream confluence)	Wildlife Species 1,2 &3	Whole Body
	Human Health Species 1,2 &3	Fillet

The permittee shall collect fillet samples of three species of fish at each sampling station to assess potential human health impacts. One species shall be collected from each of the three groups listed below (in order of preference:

Group 1	Group 2	Group 3
carp	bass	other common
channel catfish	crappie	sport fish
white sucker	sunfish	
bullhead		

The permittee shall collect whole-body samples of three fish at each sampling station to assess potential wildlife impacts. One sample shall be collected from each of the three groups listed below (in order of preference):

Group 1	Group 2	Group 3
carp	2 species - small fish	redhorse species
channel catfish	(minnows, darters,	or other common
white sucker	shiners, etc.) or redhorse	resident fish (only if using
bullhead	species, or a mixed	mixed composite in Group 2)
	composite of small fish	

Fish collection and analysis shall be conducted according to the study plan approved by Ohio EPA."

Reporting & Progress -

Annual PMP reports are due to the local Ohio EPA district office by March 1 of each year, except that POTWs with pretreatment programs may submit theirs with their annual pretreatment report. Reports need to include monitoring results for the previous year, a list of potential sources of the pollutant, and a summary of all actions taken to meet the WQBEL. This report would also be an opportunity to describe any changes to the control strategy that the results to date suggest. A blank reporting form is attached.

When a PMP is Not Required -

The permittee may request a modification to remove PMP requirements from the permit if the permittee can demonstrate that the discharge is reasonably expected to be in compliance with the WQBEL. Paragraph (C) of 3745-33-09 in the rule lists several ways that a permittee could do this, such as treatment modeling, mass-balance calculations (using source mass or monitoring data to show that the limit is being met), or fish tissue data (to show that pollutants are not bioaccumulating to levels which exceed WQS). The rule does not limit demonstrations to these methods. There may be other valid demonstrations of WQBEL compliance.

To show an example of mass-balance calculations, suppose that a discharger had identified a source of pollutants in one small wastestream; the remaining influent wastewaters don't have detectable concentrations. The discharger may be able to show that quantifiable concentrations in the small wastestream would meet the WQBEL at the final effluent when the dilution effect of the other wastewaters is considered. If the discharger could demonstrate this with repeatable sample results, then no PMP would be required.

The fate of some pollutants in a treatment works can be modeled. These pollutants may be removed in

sludges at a predictable rate, or may be destroyed through chemical reactions during treatment (see the chlorine discussion, below). If the treatment system modeling can reliably show that the pollutant will meet the WQBEL under plant operating conditions, then no PMP would be required.

Chlorine Limits

Many permits contain limits for chlorine that are less than the quantification level (0.05 mg/l). Usually, dechlorination is used to meet WQBELs for chlorine. Ohio EPA is not requiring any PMPs for dischargers that meet chlorine limits by dechlorination. These dischargers meet the WQBEL by setting the dosing rates of dechlorination chemicals so that WQBELs are achieved. Therefore, they will have demonstrated compliance with the WQBEL by treatment system modeling.

NPDES fact sheets or public notices for dischargers of chlorine in the Lake Erie Basin must contain the following paragraph (minors as well as majors):

"The effluent limit for chlorine at outfall _____ is less than the quantification level of 0.050 mg/l. However, a Pollutant Minimization Program is not required because the dosing rate of de-chlorination chemicals reasonably ensure that the WQBEL is being met."

Dischargers will not be required to make this demonstration at permit renewal time, but should keep dosing records on-file for compliance evaluations.

PMP Permit Language -

The following permit language is a template that has the basic requirements of the PMP rule and can be customized to fit specific circumstances. It's intended to be used for both industrial and public permits that have WQBELs less than the quantification level. It is not intended to be used for mercury limit variances under OAC 3745-33-07(D)(9) and (10). There will be separate guidance and permit language for those conditions.

The language in ALL CAPS needs to be customized by permit writers. These areas refer mostly to pollutants, sampling types and sampling frequencies. Influent samples should be collected using the same sample types used for effluent (mostly composites). Sources may need to be grabs, because it may not be practical to composite some sites. The minimum frequencies allowable under the rule are listed. These should be used except for known sources of the pollutant. For municipalities that run Pretreatment Programs, permit writers will need to specify the annual report due date.

"Part II. _ Pollutant Minimization Program

1) The goal of the PMP is to maintain effluent concentrations of [POLLUTANT] at or below the discharge limits in Part I. A. for outfall _____.

2) The permittee shall submit a control strategy designed to proceed toward the goal for each pollutant listed above. Control strategies shall be submitted with the first annual PMP report, or within 12 months of the effective date of this permit, whichever comes later. Control strategies shall include:

    a) Existing information on plant processes, significant and non-significant industrial, commercial and residential users of the treatment plant, and wastestreams or sewers tributary to the treatment plant.

b) A plan-of-study for locating/identifying potential sources of the pollutant.

3) Monitoring requirements:

Beginning on the effective date of this permit, the permittee shall monitor the wastewater treatment plant influent [AT LEAST ONCE PER QUARTER] by [COMPOSITE/GRAB] sample for each pollutant that is required to have a PMP.

The permittee shall monitor potential sources of [POLLUTANT] [AT LEAST TWICE PER YEAR] by [COMPOSITE/GRAB] sample for each pollutant that is required to have a PMP . Potential sources may include process lines, industrial, commercial and residential users, sewer lines and sediments, storm water inputs, atmospheric deposition, and groundwater (Inflow & Infiltration) inputs.

[PLANT- OR SOURCE-SPECIFIC REQUIREMENTS ADDED BY PERMIT WRITERS. THIS MAY INCLUDE SPECIFIC REQUIREMENTS FOR SPECIFIC SOURCES].

4) The permittee shall submit an annual report to the Division of Surface Water, _____ District Office before March 1 each year after submission of the control strategy [EXCEPT THAT PERMITTEES THAT ADMINISTER A PRETREATMENT PROGRAM MAY SUBMIT THE ANNUAL REPORT WITH THE PRETREATMENT PROGRAM ANNUAL REPORT - SPECIFY REPORTING DATE IN THE THIS PARAGRAPH]. The annual report shall include:

a) All minimization program monitoring results for the year;
b) A list of potential sources of the pollutants that are subject to PMP requirements
c) A summary of all actions taken to meet the effluent limits for those pollutants
d) Any updates of the control strategy

5) This permit may be modified, or alternatively, revoked and reissued, to revise or remove the requirements of this paragraph based on information collected under this paragraph."

Some Information/Method Sources

"Wisconsin Mercury Source Book: A Guide to Help Your Community Identify and Reduce Releases of Elemental Mercury", Wisconsin Department of Natural Resources, Draft May 1997.

Nriagu, J.O., ed. "The biogeochemistry of mercury in the environment", Canada Centre for Inland Waters, Burlington, Ontario, Canada, 1979, Elsevier/North-Holland Biomedical Press.

Richmond, John, ed. "Industrial Waste Audit and Reduction Manual: A practical guide to conducting an in-plant survey for waste reduction", Ontario Waste Management Corporation/Canviro Consultants, July 1989.

Pojasek, Robert B., "Practical Pollution Prevention: Using Cause and Effect Diagrams in Your P2 Program", Pollution Prevention Review, Summer 1996.

"Ohio Water Quality Pollution Prevention Guidance", Ohio EPA/Division of Surface Water, February 1998.

"Mercury Reduction Plan for Holland, Michigan", Michigan Department of Environmental Quality, February 6, 1997.

"Blueprint for Mercury Elimination", Great lakes Protection Fund, Great Lakes Pollution Prevention Centre, and Western lake Superior Sanitary District, March 1997.

"MWRA/MASCO Hospital Mercury Work Group, Executive Summary Report", Massachusetts Water Resources Authority and Medical and Scientific Community Organization, Inc., June 23, 1995.

"Aqueous Mercury Treatment, Capsule Report, EPA/625/R-97/004", US Environmental Protection Agency, Office of Research and Development, July 1997.

"Industrial user Inspection and Sampling Manual for POTWs, EPA 831-B-94-001", US Environmental Protection Agency, April 1994.

"Guidance for Assessing Chemical Contamination, Data for Use in Fish Advisories, Volume 1, Fish Sampling and Analysis, Second Edition, EPA 823-R-95-007", US Environmental Protection Agency, September 1995.

"Mercury Hazards to Fish, Wildlife and Invertebrates, A Synoptic Review, Biological Report 85 (1.10)", US Department of the Interior, US Fish and Wildlife Service, April 1987, Contaminant Hazard Report Number 10.

"State of Ohio Cooperative Fish Tissue Monitoring Program Guidance Manual", Ohio Department of Health (ODH), Ohio Department of Natural Resources (ODNR), Ohio Department of Agriculture (ODA) and Ohio Environmental Protection Agency (Ohio EPA).

"Ohio EPA Sediment Sampling Guide and Methodologies", Ohio Environmental Protection Agency, July 1996.

POLLUTANT MINIMIZATION PROGRAM REPORT FOR [POLLUTANT]					
Location	**Number of samples**	**Number <Det. Limit**	**Median Conc. Median Load**	**Maximum Conc. Maximum Load**	**Actions Taken to meet WQBEL**
[SOURCE #1]					
[SOURCE #2]					
[SOURCE #3]					
[SOURCE #4]					
WWTP Influent					
